IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	)	Examiner: S. KOZIOL
S. MAKRAM-EBEID, et al.	)	
	)	Art Unit: 2624
Serial No.: 10/544,204	)	
	)	Confirmation: 8412
Filed: August 2, 2005	)	
	)	
For: **IMAGE VIEWING**	)	
SYSTEM AND	)	
METHOD FOR	)	
GENERATING	)	
FILTERS FOR	)	
FILTERING IMAGE	)	
FEATURES	)	
ACCORDING TO	)	
THEIR TYPE	)	
	)	
Date of Last Office Action:	)	
May 29,2008	)	
	)	
Attorney Docket No.:	)	Cleveland, OH 44114
FR030010US / PKRX 2 00094	)	December 24, 2008

BRIEF ON APPEAL

This is an Appeal from the Final Rejection of May 29, 2008 finally rejecting claims 1-13.

I.   **STATEMENT OF REAL PARTY IN INTEREST (41.37(f))**

The real party in interest for this appeal and the present application is Koninklijke Philips Electronics N.V.

II.   **STATEMENT OF RELATED CASES (41.37(g))**

None

III.   **JURISDICTIONAL STATEMENT (41.37(h))**

The Board has jurisdiction under 35 U.S.C. 134(a).

The Examiner mailed a final rejection on May 29, 2008, setting a three-month shortened statutory period for response.

The time for responding to the final rejection expired on August 29, 2008. Rule 134.

A notice of appeal and a request for a one-month extension of time under Rule 136(a) was filed on September 29, 2008.

The time for filing an appeal brief is two months after the filing of a notice of appeal. Bd.R. 41.37(c). The time for filing an appeal brief expired on November 29, 2008. A request for a one-month extension of time under Rule 136(a) is being submitted with the filing of the appeal brief.

The appeal brief is being filed on the date set forth on the Certificate of Transmission. A request for a one-month extension of time under Rule 136(a) and a Proposed Amendment D are being submitted concurrently with the appeal brief.

IV.   **TABLE OF CONTENTS (41.37(i))**

V. TABLE OF AUTHORITIES (41.37(j))

No authorities are cited.

VI.   STATUS OF AMENDMENTS (41.37(l))

Amendment C filed July 29, 2008 has been entered.

Amendment D accompanies this Brief. It is not currently known if it will be entered.

VII.   GROUNDS OF REJECTION TO BE REVIEWED (41.37(m))

Whether claims 1-10 are anticipated in the sense of 35 U.S.C. § 102 by Gondek (US 2003/0026495).

Whether claims 11 and 13 are anticipated in the sense of 35 U.S.C. § 102 by Gondek.

Whether claim 12 is obvious in the sense of 35 U.S.C. § 103 over Gondek in view of Roth (US 5,805,236).

VIII. STATEMENT OF FACTS (41.37(n))

1. The Examiner rejects claims 1-11 and 13 under 35 U.S.C. § 102 as being anticipated by Gondek (May 29, 2008 Office Action, page 4, first paragraph).

2. The Examiner's reasoning behind rejecting claim 1 is set forth in the May 29, 2008 Office Action in the second paragraph.

3. The Examiner's rationale behind rejecting claim 2 is set forth on page 4 of the May 29, 2008 Office Action, third paragraph.

4. The Examiner's reasoning regarding the rejection of claim 3 is set forth on page 5 of the May 29, 2008 Office Action, first paragraph. The Examiner's reasoning regarding the rejection of claim 4 is set forth on page 5 of the May 29, 2008 Office Action at paragraph 2.

5. The Examiner's reasoning behind rejecting claim 5 is set forth on page 5, paragraph 3 of the May 29, 2008 Office Action.

6. The Examiner's reasoning in rejecting claim 6 is set forth on page 6, first paragraph of the May 29, 2008 Office Action.

7. The Examiner's reasoning in rejecting claim 7 is set forth on page 6, second paragraph of the May 29, 2008 Office Action.

8. The Examiner's reasoning in rejecting claim 8 is set forth on page 6, third paragraph of the May 29, 2008 Office Action.

9. The Examiner's reasoning behind the rejection of claim 9 is set forth on page7, first paragraph of the May 29, 2008 Office Action.

10. The Examiner's reasoning in rejecting claim 10 is set forth on page 7, second paragraph of the May 29, 2008 Office Action.

11. The Examiner's reasoning in rejecting claim 11 is set forth on page 7, third paragraph of the May 29, 2008 Office Action.

12. The Examiner's reasoning behind rejecting claim 13 is set forth on page 7, fourth paragraph of the May 29, 2008 Office Action.

13. The Examiner rejects claim 12 under 35 U.S.C. § 103 as being unpatentable over Gondek in view of Roth (page 8, third paragraph of the May 29, 2008 Office Action).

14. The Examiner's reasoning behind the rejection of claim 12 is set forth in the paragraph which extends from the bottom of page 8 to the top of page 9 of the May 29, 2008 Office Action.

15. Gondek sets forth a relatively basic conventional filtering technique for selecting which of a plurality of predefined filters are applied to each pixel 105 of an image (Gondek, paragraph [0016]-[0027]).

16. Gondek has a filter database 110 which stores thirteen predefined filters (Gondek, paragraph [0019], lines 3-4).

17. Each of the Gondek filters is used at specific times, such as to smooth or average out noise, enhance edges, and other situations (Gondek, paragraph [0019]).

18. The thirteen predefined filters of Gondek are described in Figure 4 and paragraph [0023] of Gondek.

19. In order to decide which of the thirteen predefined filters should be applied, a filter section module 106 analyzes the pixels which surround the input pixel 105 and selects an appropriate one of the thirteen predefined filters (Gondek, paragraph [0016]-[0017]).

20. In the present application, block 5 determines the probability (Fi) that each pixel represents one of m different types of features (the present application, page 5, line 16 – page 7, line 2).

21. Based on these probabilities, a combining processor 10 generates a vector VC (the present application, page 5, line 16 – page 7, line 2).

22. The components C of the vector are based on the probabilities F_i that each pixel has each of the m types of features of the group of features (the present application, page 5, line 16 – page 7, line 2).

23. Based on this vector, in a pre-mixing embodiment, a synthesizing means designs a custom filter or filter kernel by combining a plurality of preselected filter kernels or filters with the weighting which each of these predescibed filter kernels being determined by the vector VC (page 3, lines 3-7; page 7, line 9 – page 8, line 6).

24.   In another embodiment called post-mixing filtering, a plurality of filters are applied to the image pixel (page 3, lines 7-10; page 8, line 7 – page 9, line 10).

25.   In post-mixing filtering, the filtered values of the pixel Gi are combined with a weighting controlled by the control vector VC to produce the filtered image pixel G(x) (the present application, page 5, line 16 – page 7, line 2).

IX.   ARGUMENT (41.37(o))

A.   Background

Gondek, at paragraphs [0016]-[0027] sets forth a relatively basic conventional filtering technique for selecting one of a plurality of predefined filters to be applied to each pixel 105 of an image. Gondek has a filter database 110 which stores 13 predefined filters (paragraph [0019], lines 4-5). Each of these filters is used at specific times, such as to smooth or average out noise, enhance edges, and other situations as discussed in paragraph [0019] of Gondek. The thirteen predefined filters of Gondek are described in Figure 4 and paragraph 23.

In order to decide which of the thirteen predefined filters, numbered 0 through 12 is to be applied, a filter selection module 106 analyzes the pixels which surround input pixel 105 (note window 104 in Figure 1) and selects an appropriate **one** of the thirteen predefined filters (see paragraphs [0016]-[0017]).

Filtering the pixel 105 typically involves replacing the pixel 105 with a weighted combination of pixels in the window 104. For example, filter 3 of Gondek (Figure 4; paragraph [0023]), is a pass through filter that weights the input pixel 100% and the surrounding pixels 0. Filters 0, 1, and 2 provide smoothing enhancement, i.e., replace the input pixel 105 with a weighted average of the pixels in the window. The more heavily the input pixel 105 is weighted relative to the surrounding pixels, the less

the smoothing. Conversely, the more the surrounding pixels are weighted relative to the input pixel, the greater the smoothing.

Filters 4, 5, and 6 provide increasing degrees of sharpness-enhancement on diagonal edges and filters 7, 8, and 9 provide increasing amounts of sharpening enhancement on vertical edges, and filters 10, 11, and 12 sharpen pixels along horizontal edges (paragraph [0024]-[0025]). Thus, in Gondek, only one of the thirteen predefined filters is applied to each input pixel.

By contrast, the present application focuses on a technique in which custom filters or filter kernels are designed for each pixel of the image. Specifically, in the present application, block 5 determines the probability (Fi) that each pixel represents one of m different types of features (Figure 1, page 5, lines 17-34). Based on these m probabilities, a combining operator 10 generates a control vector 11 (V_c) which controls the creation of the adaptive kernels of the filter to be constructed and applied (page 6, line 21 – page 7, line 2). The components of the control vector are based on the probabilities that the pixel has each of the m types of features of the group of features. Based on this vector, a synthesizing means generates filter kernels at each image point adapted to the type of features of interest, which filter kernels are controlled by the control vector 11. In pre-mixing filtering chain, a combination operator 30 (X_H) receives the control vector (V_c) and generates an adaptive kernel 35 (H)

(page 7, lines 10-15), e.g., the sum of the m available filters each weighted by their probability as indicated by the corresponding components of the vector V_c. Thus custom filter kernel H filters the pixel x in question from the image I(x) to generate a filtered pixel 3 (H(x)) (page 8, lines 2-6).

In a post-mixing filtering chain, the image pixel is filtered by each of m filters g_1, ..., g_m to generate m filtered pixel values G_1, ..., G_m. The control vector V_c weights and combines the values G_1, ..., G_m to generate a final filtered pixel 2 (G(x)) (page 8, lines 8-26).

B. The Claims Are Not Anticipated by Gondek

1. Claims 1-10 Are Not Anticipated by Gondek

These arguments are based on the arguments on page 8 of Amendment C of July 29, 2008.

First, claim 1 calls for estimating at each point a probability measure Fi of the presence of a type of feature. By contrast, in Gondek, the filter section 106 examines the pixel window 104 surrounding the image point 105 to be filtered and determines the type of feature the present pixel represents. More specifically, the filter section module 106 analyzes the pixels in the window and selects **one** of the thirteen predefined filters. There is no disclosure in Gondek of determining a probability measure, much less a probability measure for determining a

probability that each pixel point 105 is each of a plurality of different feature types.

Second, claim 1 calls for determining a weighting control vector (VC) from the probability measures. Gondek not only does not determine probability measures, but Gondek does not disclose generating a control vector or any other type of vector based on such probability measures. Again, Gondek selects **one** filter and applies that one selected predefined filter.

Third, claim 1 calls for a synthesizing means for generating filter kernels at each image point adapted to the features of interest. Gondek does not generate filter kernels. Rather, Gondek has thirteen predefined filter kernels and selects one of thirteen predefined filter kernels for each image point. Gondek discloses no synthesizing means and does not synthesize or generate a filter kernel for each image point. Again, Gondek applies one of the thirteen predefined filters.

Fourth, claim 1 calls for generating of filter kernels to be controlled by the weighting control vector (VC). Gondek not only has no weighting control vector, Gondek further does not generate filter kernels based on a weighting control or any other type of vector.

Accordingly, it is submitted that claim 1 and claims 2-10 dependent therefrom are not anticipated by Gondek.

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a.   **Claim 2 is Not Anticipated by
Gondek**

This argument is based on the argument presented on page 8 of Amendment C.

Claim 2 calls for a combining means having an input which receives the weighting control vector (VC) and an output which outputs weighted adaptive filter kernels (35, H) . Gondek neither discloses a weighting control vector nor any other type of vector, nor a combining means which outputs weighted adaptive kernels (35, H).

Accordingly, it is submitted that claim 2 is not anticipated by Gondek.

b.   **Claim 3 is Not Anticipated by
Gondek**

This argument is based on the argument presented on page 8 of Amendment C.

Claim 3 calls for both isotropic and anisotropic filtering means which are applied **independently** of the type of image features whose output G(i) are combined at each image point and adapted using the weighting control vector (11, VC) to produce the filtered image signal (G(x)). By contrast, Gondek filters each image point with only one of the thirteen predefined filters. Gondek does not apply both isotropic and anisotropic filters independently of the type of image feature. Gondek

does not disclose filtering an image point with a plurality of features and combining the filtered outputs.

Further, Gondek does not disclose combining differently filtered outputs, much less weighting the filter outputs, much less combining the outputs using a weighting control or other vector.

Accordingly, it is submitted that claim 3 is not anticipated by Gondek.

   c.   **Claim 4 is Not Anticipated by Gondek**

This argument is based on the argument presented on page 9 of Amendment C.

Claim 4 calls for the analyzing means to determine the probability measure for each of a plurality of image features. Gondek does not disclose determining a probability measure nor does Gondek disclose outputting such a probability measure. Rather, Gondek merely selects one of the thirteen predefined filters without determining a probability measure associated with each one.

Accordingly, it is submitted that claim 4 is not anticipated by Gondek.

d.   Claim 7 is Not Anticipated by Gondek

This argument is based on the argument presented on page 9 of Amendment C.

Claim 7 calls for outputting an adaptive filter H which adaptive filter is adapted by weighting parameters defined by the control vector (VC). Gondek does not disclose a weighting control vector. Nor, does Gondek disclose outputting an adaptive filter kernel H in accordance with the weighting parameters defined by the control vector (VC). To the contrary, Gondek merely discloses outputting a selected one of the thirteen predefined filters.

Accordingly, it is submitted that claim 7 is not anticipated by Gondek.

e.   Claim 8 is Not Anticipated by Gondek

These arguments have been expanded and contain new arguments over those presented in Amendment C.

Claim 8 calls for applying a number of different filtering means independently of the types of features examined in the image. Gondek does not disclose independently applying different filters. Rather, Gondek selects and applies only one predefined filter to a given input pixel.

Claim 8 further calls for a combination operator (XG) which combines the outputs of the various filters in accordance with the control vector (VC). By contrast, Gondek applies a single one of the predefined filters and does not combine the outputs of other filters operating on the same pixel, much less control the combining of the outputs of various filters with a weighting control or other vector.

Accordingly, it is submitted that claim 8 is not anticipated by Gondek.

f. Claim 9 is Not Anticipated by Gondek

This argument is based on the argument presented on page 9 of Amendment C.

Claim 9 calls for a weighted sum of the results of the different filtering means. Gondek does not combine or sum the outputs of different filters. Rather, each pixel is filtered once by a selected one of the predefined filters. There is no suggestion of combining the output of several of the predefined filters.

g. Claim 10 is Not Anticipated by Gondek

This argument is new.

Claim 10 calls for selecting either a pre-mixing filtering means or a post-mixing filtering means. Gondek discloses neither a pre-mixing nor a post-mixing filtering means.

Accordingly, it is submitted that claim 10 is not anticipated by Gondek.

2. Claims 11 and 13 Are Not Anticipated by Gondek

This argument is based on the argument presented on page 9 of Amendment C.

Claim 11 calls for estimating at each image point a probability measure of the presence of a type of feature. Gondek does not determine a probability measure, much less a probability measure for the presence of each type of feature. Rather, for each image point, Gondek selects one type of feature and the corresponding one of the predefined filters.

Claim 11 calls for determining a weighting control model yielding a weighting control vector from the probability measure. Gondek does not disclose a weighting control vector or a weighting control model. Gondek does not disclose the probability measures which would be needed to generate such a weighting control vector or model.

Claim 11 calls for generating filter kernels at each image point adapted to the type of features of interest, which generation of filter kernels is controlled by the weighting control vector. Gondek does not

generate filter kernels at each point. Rather, Gondek selects one of a plurality of the predefined filter kernels for each point. Gondek neither has a control vector nor generates filters or filter kernels under the control of a vector.

Accordingly, it is submitted that claim 11 and claim 13 dependent therefrom are not anticipated by Gondek.

C. Claim 12 is Not Obvious in the Sense of 35 U.S.C. § 103 Over Gondek as Modified by Roth
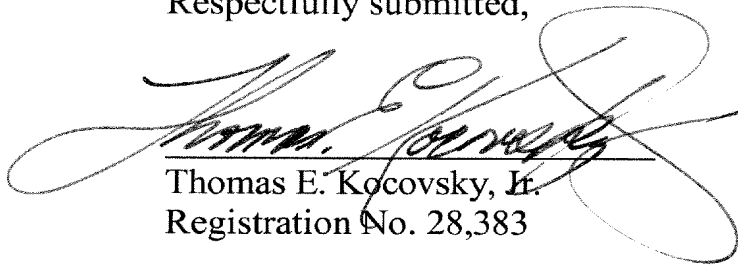
This is a new argument.

The Examiner applies Roth only for its disclosure of a medical imaging device and does not allege that Roth addresses or overcomes any of the shortcomings discussed in conjunction with claim 1 above from which claim 12 depends. Accordingly, it is submitted that Roth does not cure the shortcomings of Gondek and that claim 12 distinguishes patentably and unobviously over Gondek as modified by Roth to add a medical control device as the source of the images. The Examiner does not allege that and, indeed, Roth does not cure the shortcomings noted above in Section B(1) in conjunction with parent claim 1. It is submitted that claim 12 distinguishes patentably and unobviously over the references of record.

D. **CONCLUSION**

For all of the reasons discussed above, it is respectfully submitted that claims 1-13 are not anticipated by and distinguish patentably over the applied references of record. For all of the above reasons, a reversal of the rejections of all claims is requested.

Respectfully submitted,

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APPENDIX

X. CLAIMS SECTION (41.37(p))

1. (Rejected)   Image processing system for generating a multidimensional adaptive oriented filter to be applied to the point intensities of an image formed in a number d of dimensions, comprising:

analyzing means comprising means (5, fi) to estimate at each image point a probability measure (Fi) of the presence of a type of feature of interest and to determine from said probability measure a weighting control model (10) yielding a weighting control vector (11, VC) for the user to control synthesized adaptive kernels at each image point; and

synthesizing means for generating filter kernels at each image point adapted to the type of the features of interest, which filter kernels are controlled by the weighting control vector.

2. (Rejected)   The image processing system of Claim 1, wherein the synthesizing means comprises means for generating:

filtering means called "pre-mixing filtering means" comprising combining means (30, XH) dependent on the type of the image features having inputs for the weighting control vector (11, VC) and the image data [I(x)] and having an output for weighted adaptive kernels (35, H)

adapted to the type of the image features to produce the filtered image signal [H(x)].

3. (Rejected)   The image processing system of Claim 1, wherein the synthesizing means comprises means for generating:

filtering means called "post-mixing filtering means" comprising both isotropic and anisotropic filtering means [15, gi)] applied independently of the type of the image features, whose outputs (Gi) are combined at each image point and adapted using the weighting control vector (11, VC) to produce the filtered image signal [G(x)].

4. (Rejected)   The image processing system of Claim 1, wherein the analyzing means comprises a number m of operators (f1,..,fi,..,fm), which outputs at each current point of the image the probability measure (F1,..,Fi,..,Fm) of presence of features of interest among the m types of different features in the image to be filtered.

5. (Rejected)   The image processing system of Claim 1, wherein the analyzing means comprises a combining operator (10, Xu), called user operator, which receives at its input the probability measures (F1,..,Fi,..,Fm) of presence of different types of features for forming the weighting control model, which provides at its outputs the control vector

(VC) of k components (C1,..,Ci,..,Ck), for controlling the adaptive kernels of the synthesized filters.

6. (Rejected)   The image processing system of Claim 1, wherein the features of interest are chosen among anisotropic features and isotropic features.

7. (Rejected)   The image processing system of Claim 6, wherein the synthesizing means comprises, in the "pre-mixing filtering means", a combining operator (30, XH), which receives at its input, the control vector VC and the image data I(x) and which provides at its output an adaptive kernel (H) that is adapted to the orientation of the anisotropic oriented features and/or to the dimensions of the isotropic features to be filtered or enhanced by the weighting parameters defined by the control vector (VC).

8. (Rejected)   The image processing system of Claim 6, wherein the synthesizing means comprises, in the "post-mixing filtering means", a number m of different filtering means (g1,..,gi,..,gm), which are applied independently of the types of the features examined in the image, whose number m corresponds to the number m of features of different types to be processed and whose outputs (G1,..,Gi,..,Gm) are

mixed in a combination operator (XG), which is controlled by the control vector (VC) to produce the filtered image signal [G(x)].

9. (Rejected)   The image processing system of Claim 8, wherein the combination operator (XG) is a weighted sum of the results of the different filtering means (g1,..,gi,..,gm).

10. (Rejected)   The image processing system of Claim 2, wherein a user control interface (158) is provided for the user to control the weighting parameters (C1,..,Ci,..,Ck) of the control vector (VC); for selecting the "pre-mixing filtering means" and/or the "post-mixing filtering means"; for varying the strength of filtering or enhancement related to the different type of features at the output of the combination operator (XG) while combining the results (G1,..,Gi,..,Gm) to produce the filtered image signal [G(x)] in the "post-mixing filtering means"; and/or at the input of the combination operator (XH) in the "pre-mixing filtering means".

11. (Rejected)   Image processing method for generating a multidimensional adaptive oriented filter to be applied to point intensities of an image formed in a number (d) of dimensions, the method comprising:

estimating at each image point a probability measure (Fi) of the presence of a type of feature of interest;

determining from said probability measure a weighting control model yielding a weighting control vector (VC) for a user to control synthesized adaptive kernels at each image point; and

generating filter kernels at each image point adapted to the type of the features of interest, which filter kernels are controlled by the weighting control vector.

12. (Rejected)   Medical examination apparatus comprising means to acquire d-dimensional image data [I(x)], a system as Claimed in Claim 1 and further comprising a display system (154) for visualizing processed images and user control means (158) for selecting weighting parameters and/ or acting on the user operator (10) and/or the selection unit (40).

13. (Rejected)   A computer program product comprising a set of instructions for carrying out the method as claimed in Claim 11.

APPENDIX (Continued)

XI. CLAIM SUPPORT AND DRAWING ANALYSIS SECTION (41.37(r))

1. Image processing system for generating a multidimensional adaptive oriented filter to be applied to the point intensities of an image formed in a number d of dimensions {**p. 4, l. 23-28**}, comprising:

analyzing means comprising means (5, fi) to estimate at each image point a probability measure (Fi) of the presence of a type of feature of interest and to determine from said probability measure a weighting control model (10) yielding a weighting control vector (11, VC) for the user to control synthesized adaptive kernels at each image point {**p. 5, l. 16 – p. 7, l. 2; p. 9, l. 15-18; Figs. 1, 2**}; and

synthesizing means for generating filter kernels at each image point adapted to the type of the features of interest, which filter kernels are controlled by the weighting control vector {**p. 7, l. 3 – p. 9, l. 10; p. 9, l. 19-20; Figs. 1, 2**}.

2. The image processing system of Claim 1, wherein the synthesizing means comprises means for generating:

filtering means called "pre-mixing filtering means" comprising combining means (30, XH) dependent on the type of the image features

having inputs for the weighting control vector (11, VC) and the image data [I(x)] and having an output for weighted adaptive kernels (35, H) adapted to the type of the image features to produce the filtered image signal [H(x)] {**p. 3, l. 3-7; p. 7, l. 9 – p. 8, l. 6; Figs. 1-2**}.

3. The image processing system of Claim 1, wherein the synthesizing means comprises means for generating:

filtering means called "post-mixing filtering means" comprising both isotropic and anisotropic filtering means [15, gi)] applied independently of the type of the image features, whose outputs (Gi) are combined at each image point and adapted using the weighting control vector (11, VC) to produce the filtered image signal [G(x)] {**p. 3, l. 7-10; p. 8, l. 7 – p. 9, l. 10; Figs. 1-2**}.

4. The image processing system of Claim 1, wherein the analyzing means comprises a number m of operators (f1,..,fi,..,fm), which outputs at each current point of the image the probability measure (F1,..,Fi,..,Fm) of presence of features of interest among the m types of different features in the image to be filtered {**p. 5, l. 17-34; p. 9, l. 15-18; Figs. 1-2**}.

5. The image processing system of Claim 1, wherein the analyzing means comprises a combining operator (10, Xu), called user operator, which receives at its input the probability measures (F1,..,Fi,..,Fm) of presence of different types of features for forming the weighting control model, which provides at its outputs the control vector (VC) of k components (C1,..,Ci,..,Ck), for controlling the adaptive kernels of the synthesized filters {**p. 2, l. 29 – p. 3, l. 2; p. 6, l. 18-31; Figs. 1-2**}.

6. The image processing system of Claim 1, wherein the features of interest are chosen among anisotropic features and isotropic features { **p. 3, l. 16-17; p. 5, l. 20-23; p. 8, l. 27**}.

7. The image processing system of Claim 6, wherein the synthesizing means comprises, in the "pre-mixing filtering means", a combining operator (30, XH), which receives at its input, the control vector VC and the image data I(x) and which provides at its output an adaptive kernel (H) that is adapted to the orientation of the anisotropic oriented features and/or to the dimensions of the isotropic features to be filtered or enhanced by the weighting parameters defined by the control vector (VC) {**p. 7, l. 10-15; p. 9, l. 21-25; Figs. 1-2**}.

8. The image processing system of Claim 6, wherein the synthesizing means comprises, in the "post-mixing filtering means", a number m of different filtering means (g1,..,gi,..,gm), which are applied independently of the types of the features examined in the image, whose number m corresponds to the number m of features of different types to be processed and whose outputs (G1,..,Gi,..,Gm) are mixed in a combination operator (XG), which is controlled by the control vector (VC) to produce the filtered image signal [G(x)] {**p. 8, l. 8-18; p. 9, l. 26-32; Figs. 1-2**}.

9. The image processing system of Claim 8, wherein the combination operator (XG) is a weighted sum of the results of the different filtering means (g1,..,gi,..,gm) {**p. 8, l. 8-26; p. 9, l. 26-32; Figs. 1-2**}.

10. The image processing system of Claim 2, wherein a user control interface (158) is provided for the user to control the weighting parameters (C1,..,Ci,..,Ck) of the control vector (VC); for selecting the "pre-mixing filtering means" and/or the "post-mixing filtering means"; for varying the strength of filtering or enhancement related to the different type of features at the output of the combination operator (XG) while combining the results (G1,..,Gi,..,Gm) to produce the filtered image

signal [G(x)] in the "post-mixing filtering means"; and/or at the input of the combination operator (XH) in the "pre-mixing filtering means" {**p. 3, l. 3-15; Figs. 1-2**}.

11. Image processing method for generating a multidimensional adaptive oriented filter to be applied to point intensities of an image formed in a number (d) of dimensions {**p. 5, l. 4-13**}, the method comprising:

estimating at each image point a probability measure (Fi) of the presence of a type of feature of interest {**p. 5, l. 17-23 & 32-34**};

determining from said probability measure a weighting control model yielding a weighting control vector (VC) for a user to control synthesized adaptive kernels at each image point {**p. 9, l. 15-18**}; and

generating filter kernels at each image point adapted to the type of the features of interest, which filter kernels are controlled by the weighting control vector {**p. 9, l. 19-20**}.

12. Medical examination apparatus comprising means to acquire d-dimensional image data [I(x)], a system as Claimed in Claim 1 and further comprising a display system (154) for visualizing processed images and user control means (158) for selecting weighting parameters

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and/ or acting on the user operator (10) and/or the selection unit (40) {**p. 10, l. 1-4; Fig. 3**}.

13. A computer program product comprising a set of instructions for carrying out the method as claimed in Claim 11 {**p. 10, l. 14-15**}.

APPENDIX (Continued)

XII. MEANS OR STEP PLUS FUNCTION ANALYSIS SECTION (41.37(s))

1. Image processing system for generating a multidimensional adaptive oriented filter to be applied to the point intensities of an image formed in a number d of dimensions **{p. 4, l. 23-28}**, comprising:

analyzing means comprising means (5, fi) to estimate at each image point a probability measure (Fi) of the presence of a type of feature of interest and to determine from said probability measure a weighting control model (10) yielding a weighting control vector (11, VC) for the user to control synthesized adaptive kernels at each image point **{p. 5, l. 16 – p. 7, l. 2; p. 9, l. 15-18; Figs. 1, 2}**; and

synthesizing means for generating filter kernels at each image point adapted to the type of the features of interest, which filter kernels are controlled by the weighting control vector **{p. 7, l. 3 – p. 9, l. 10; p. 9, l. 19-20; Figs. 1, 2}**.

2. The image processing system of Claim 1, wherein the synthesizing means comprises means for generating:

filtering means called "pre-mixing filtering means" comprising combining means (30, XH) dependent on the type of the image features

having inputs for the weighting control vector (11, VC) and the image data [I(x)] and having an output for weighted adaptive kernels (35, H) adapted to the type of the image features to produce the filtered image signal [H(x)] {p. 3, l. 3-7; p. 7, l. 9 – p. 8, l. 6; Figs. 1-2}.

3. The image processing system of Claim 1, wherein the synthesizing means comprises means for generating:

filtering means called "post-mixing filtering means" comprising both isotropic and anisotropic filtering means [15, gi)] applied independently of the type of the image features, whose outputs (Gi) are combined at each image point and adapted using the weighting control vector (11, VC) to produce the filtered image signal [G(x)] {p. 3, l. 7-10; p. 8, l. 7 – p. 9, l. 10; Figs. 1-2}.

4. The image processing system of Claim 1, wherein the analyzing means comprises a number m of operators (f1,..,fi,..,fm), which outputs at each current point of the image the probability measure (F1,..,Fi,..,Fm) of presence of features of interest among the m types of different features in the image to be filtered {p. 5, l. 17-34; p. 9, l. 15-18; Figs. 1-2}.

5. The image processing system of Claim 1, wherein the analyzing means comprises a combining operator (10, Xu), called user operator, which receives at its input the probability measures (F1,..,Fi,..,Fm) of presence of different types of features for forming the weighting control model, which provides at its outputs the control vector (VC) of k components (C1,..,Ci,..,Ck), for controlling the adaptive kernels of the synthesized filters **{p. 2, l. 29 – p. 3, l. 2; p. 6, l. 18-31; Figs. 1-2}**.

7. The image processing system of Claim 6, wherein the synthesizing means comprises, in the "pre-mixing filtering means", a combining operator (30, XH), which receives at its input, the control vector VC and the image data I(x) and which provides at its output an adaptive kernel (H) that is adapted to the orientation of the anisotropic oriented features and/or to the dimensions of the isotropic features to be filtered or enhanced by the weighting parameters defined by the control vector (VC) **{p. 7, l. 10-15; p. 9, l. 21-25; Figs. 1-2}**.

8. The image processing system of Claim 6, wherein the synthesizing means comprises, in the "post-mixing filtering means", a number m of different filtering means (g1,..,gi,..,gm), which are applied independently of the types of the features examined in the image, whose

number m corresponds to the number m of features of different types to be processed and whose outputs (G1,..,Gi,..,Gm) are mixed in a combination operator (XG), which is controlled by the control vector (VC) to produce the filtered image signal [G(x)] {**p. 8, l. 8-18; p. 9, l. 26-32; Figs. 1-2**}.

10. The image processing system of Claim 2, wherein a user control interface (158) is provided for the user to control the weighting parameters (C1,..,Ci,..,Ck) of the control vector (VC); for selecting the "pre-mixing filtering means" and/or the "post-mixing filtering means"; for varying the strength of filtering or enhancement related to the different type of features at the output of the combination operator (XG) while combining the results (G1,..,Gi,..,Gm) to produce the filtered image signal [G(x)] in the "post-mixing filtering means"; and/or at the input of the combination operator (XH) in the "pre-mixing filtering means" {**p. 3, l. 3-15; Figs. 1-2**}.

12. Medical examination apparatus comprising means to acquire d-dimensional image data [I(x)], a system as Claimed in Claim 1 and further comprising a display system (154) for visualizing processed images and user control means (158) for selecting weighting parameters

and/ or acting on the user operator (10) and/or the selection unit (40) {**p. 10, l. 1-4; Fig. 3**}.

APPENDIX (Continued)

XIII. **EVIDENCE SECTION (41.37(t))**

None.

APPENDIX (Continued)

XIV. RELATED CASES SECTION (41.37(u))

None.